

Docket No. 303.632US1
WD # 439121

Micron Ref. No. 99-0472

CLEAN VERSION OF PENDING CLAIMS

ELECTROSTATIC DISCHARGE PROTECTION DEVICE

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Serial No.: 09/648,919

Claims 1-7, 13, 17-29 and 33-35, as of November 13, 2002 (Date of Response to Final Office Action).

1. (Amended) An electrostatic discharge (ESD) protection device comprising:
a substrate;
a first doped region formed in the substrate for connecting to a bonding pad; and
a second doped region formed in the substrate for connecting to a power node, wherein
the second doped region is separated from the first doped region by only the substrate region,
wherein the ESD protection device comprises no gate above the first and second doped regions,
wherein the ESD protection device comprises no isolation structure between the first and second
dope regions, and wherein only one path exists between the bonding pad and the power node
through the substrate.
2. The ESD protection device of claim 1, wherein the substrate comprises a first
conductivity type and the first and second doped regions comprise a second conductivity type.
3. The ESD protection device of claim 1, wherein the substrate comprises a p-type
conductivity material and the first and second doped regions comprise an n-type conductivity
material.
4. The ESD protection device of claim 1, wherein first and second doped regions comprise a
higher doping concentration than a doping concentration of the substrate.

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5. The ESD protection device of claim 1 further comprising a first isolation structure placed on an opposing side of the first doped region from a region separating the first and the second doped regions, and a second isolation structure placed on an opposing side of the second doped region from a region separating the first and the second doped regions.

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6. (Amended) An electrostatic discharge (ESD) protection device comprising:
a substrate;
a first doped region formed in the substrate for connecting to a bonding pad; and
a second doped region formed in the substrate for connecting to a power node, wherein the second doped region is separated from the first doped region by only the substrate region, wherein an amount current flowing between the first and second doped regions is not controlled by a voltage potential of a gate above the first and second doped regions, wherein the ESD protection device comprises no isolation structure between the first and second doped regions, and wherein only one path exists between the bonding pad and the power node through the substrate.

7. (Amended) A gateless electrostatic discharge (ESD) protection device comprising:
a substrate;
a first doped region formed in the substrate for connecting to a bonding pad; and
a second doped region formed in the substrate for connecting to a power node for receiving a power source, wherein the second doped region is separated from the first doped region by only the substrate region, wherein the ESD protection device comprises no isolation structure between the first and second doped regions, and wherein only one path exists between the bonding pad and the power node through the substrate.

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13. (Amended) An electrostatic discharge (ESD) protection device comprising:
a substrate; and
an implant within the substrate, the implant including two implant regions spaced apart

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by only the substrate region, one of the two implant regions being connected to a bonding pad, another one of the two implant regions being connected to a power node, wherein the substrate comprises a first conductivity type and the two implant regions comprise a second conductivity type, wherein conductivity between the two implant regions is not controlled by voltage potential of a gate above the two implant regions, wherein the ESD protection device comprises no isolation structure between the first and second dope regions, and wherein only one path exists between the bonding pad and the power node through the substrate.

17. (Amended) An integrated circuit comprising:

a voltage source;

an external bonding pad; and

an electrostatic discharge (ESD) protection device connected between the external bonding pad and the voltage source, the ESD protection device comprising:

a substrate;

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a first doped region formed in the substrate and connected to the external bonding pad; and

a second doped region formed in the substrate and connected to the voltage source, wherein the second doped region is separated from the first doped region by only the substrate region, wherein the ESD protection device comprises no gate above the first and second doped regions, wherein the ESD protection device comprises no isolation structure between the first and second dope regions, and wherein only one path exists between the external bonding pad and the voltage source through the substrate.

18. The ESD protection device of claim 17, wherein the substrate comprises a first conductivity type and the first and second doped regions comprise a second conductivity type.

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19. The ESD protection device of claim 17, wherein the substrate comprises a p-type conductivity material and the first and second doped regions comprise an n-type conductivity material.
20. The ESD protection device of claim 17, wherein first and second doped regions comprise a higher doping concentration than a doping concentration of the substrate.
21. The integrated circuit of claim 17, wherein the voltage source is connected to ground.
22. The integrated circuit of claim 17, wherein the voltage source is connected to a voltage supply.
23. (Amended) An integrated circuit comprising:
a first voltage source;
a second voltage source;
an external bonding pad;
a first electrostatic discharge (ESD) protection device connected between the first voltage source and the external bonding pad; and
a second ESD protection device connected between the second voltage source and the external bonding pad, wherein the second ESD protection device comprising:
a substrate;
a first doped region formed in the substrate and connected to the second external bonding pad; and
a second doped region formed in the substrate and connected to the second voltage source, wherein the second doped region is separated from the first doped region by only the substrate region, wherein the ESD protection device comprises no gate above the first and second doped regions, wherein the ESD protection device comprises no isolation structure

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between the first and second dope regions, and wherein only one path exists between the external bonding pad and the second voltage source through the substrate.

24. The integrated circuit of claim 23, wherein the first voltage source is substantially smaller than the second voltage source.

25. The integrated circuit of claim 23, wherein the first voltage source is connected to ground.

26. The integrated circuit of claim 23, wherein the second voltage source is connected to a voltage supply.

27. (Amended) An integrated circuit comprising:
a voltage source;
an external bonding pad;
an internal circuit connected to the external bonding pad at a node; and
an electrostatic discharge (ESD) protection device connected between the node and the voltage source, the ESD protection device comprising:
a substrate;
a first doped region formed in the substrate and connected to the external bonding pad; and
a second doped region formed in the substrate and connected to the voltage source, wherein the second doped region is separated from the first doped region by only the substrate region, wherein the ESD protection device comprises no gate above the first and second doped regions, wherein the ESD protection device comprises no isolation structure between the first and second dope regions, and wherein only one path exists between the external bonding pad and the voltage source through the substrate.

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28. (Amended) An integrated circuit comprising:
- a first voltage source;
 - a second voltage source;
 - an external bonding pad;
 - an internal circuit connected to the external bonding pad at a node;
 - a first electrostatic discharge (ESD) protection device connected between the first voltage source and the node;

and

a second ESD protection device connected between the second voltage source and the node, wherein the second ESD protection device comprising:

- a substrate;
- a first doped region formed in the substrate and connected to the second external bonding pad; and
- a second doped region formed in the substrate and connected to the second voltage source, wherein the second doped region is separated from the first doped region by only the substrate region, wherein the ESD protection device comprises no gate above the first and second doped regions, wherein the ESD protection device comprises no isolation structure between the first and second doped regions, and wherein only one path exists between the external bonding pad and the second voltage source through the substrate.

29. (Amended) A semiconductor chip comprising:
- a package having a plurality of pins; and
 - an electrostatic discharge (ESD) protection device connected to at least one of the pins, the protection device comprising:
 - a substrate;
 - a first doped region formed in the substrate for connecting to the at least one of the pins; and

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a second doped region formed in the substrate for connecting to a power node, wherein the second doped region is separated from the first doped region by only the substrate region, wherein the ESD protection device comprises no gate above the first and second doped regions, wherein the ESD protection device comprises no isolation structure between the first and second dope regions, and wherein only one path exists between the at least one of the pins and the power node through the substrate.

33. (Amended) A chip comprising:

a package having a plurality of pins; and

a protection device connected to at least one of the pins, the protection device comprising:

a substrate;

a first doped region formed in the substrate and connected to the at least one of the pins; and

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a second doped region formed in the substrate for connecting to a power node, wherein the second doped region is separated from the first doped region by only the substrate region, wherein the protection device comprises no isolation structure between the first and second dope regions, and wherein only one path exists between the at least one of the pins and the power node through the substrate.

34. (Amended) A chip comprising:

a package having a plurality of pins; and

a protection device connected to at least one of the pins, the protection device comprising:

a substrate; and

an implant within the substrate, the implant including two implant regions spaced apart by only the substrate region, one of the two implant regions being connected to the at least

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one of the pins, another one of the two implant regions being connected to a power node, wherein the substrate comprises a first conductivity type and the two implant regions comprise a second conductivity type, wherein conductivity between the two implant regions is not controlled by voltage potential of a gate above the two implant regions, wherein the protection device comprises no isolation structure between the first and second dope regions, and wherein only one path exists between the at least one of the pins and the power node through the substrate.



35. (Amended) A chip comprising:

a package having a plurality of pins; and

a protection device connected to at least one of the pins, the protection device comprising:

a substrate;

a first doped region formed in the substrate and connected to the at least one of the pins; and

a second doped region formed in the substrate for connecting to a power node, wherein the second doped region is separated from the first doped region by only the substrate region such that an amount current flowing between the first and second doped regions is not controlled by a voltage potential of a gate above the first and second doped regions, wherein the protection device comprises no isolation structure between the first and second dope regions, and wherein only one path exists between the at least one of the pins and the power node through the substrate.